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November 04, 2004

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APPLICATION NUMBER: 60/509,284
FILING DATE: *October 07, 2003*
RELATED PCT APPLICATION NUMBER: *PCT/US04/32576*

Certified by



Jon W Dudas

Acting Under Secretary of Commerce
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

PTO/SB/18 (5-03)
17302 U.S. PTO
60/509284



INVENTOR(S)					
Given Name (first and middle (if any))		Family Name or Surname		Residence (City and either State or Foreign Country)	
Harry K. George M.		Charles, Jr. Murray		Laurel, Maryland Columbia, Maryland	
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (280 characters max)					
Authentication of Injection Molded Epoxy-Based Electronics Packages Using Molecularly Imprinted Taggants					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer Number		<input type="text"/>		<div>Place Customer Number Bar Code Label here</div>	
OR Type Customer Number here					
<input checked="" type="checkbox"/> Firm or Individual Name	Office of Patent Counsel				
Address		THE JOHNS HOPKINS UNIVERSITY/Applied Physics Laboratory			
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Country	U.S.A.	Telephone	(240) 228-5640	Fax	(220) 228-5254
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification	Number of Pages	2	<input type="checkbox"/> CD(s), Number	<input type="text"/>	
<input checked="" type="checkbox"/> Drawing(s)	Number of Sheets	1	<input type="checkbox"/> Other (specify)	<input type="text"/>	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)					
<input checked="" type="checkbox"/>	Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)
<input type="checkbox"/>	A check or money order is enclosed to cover the filing fees				
<input checked="" type="checkbox"/>	The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number				
<input type="checkbox"/>	Payment by credit card. Form PTO-2038 is attached.				
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/>	No.				
<input type="checkbox"/>	Yes, the name of the U.S. Government agency and the Government contract number are: _____				

Respectfully submitted,

SIGNATURE

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Date

10/6/03

REGISTRATION NO.

31,495

(if appropriate)

Docket Number:

1990-SPL PRV

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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P19SMALL/REV05

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. 1990-SPL PRV

In re application of: Harry K. Charles, et al.

For: Authentication of Injection Molded Epoxy-Based Electronics Packages Using
Molecularly Imprinted Taggants

Mail Stop Provisional Application

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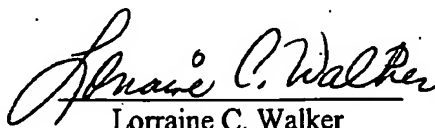
"Express Mail" label number EV248631505US

Date of Deposit: 10/7/03

I hereby certify that the following attached provisional patent application as identified
above consisting of:

1. Postcard receipt
2. Provisional Application for Patent Cover Sheet (1 pp.) (in duplicate)
3. Provisional application (2 pp. spec.)
4. 1 sheet drawings

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee"
service under 37 CFR 1.10 on the date indicated above and is addressed to Mail Stop Provisional
Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.


Lorraine C. Walker

/lcw

JHU/APL Docket No. 1990-SPL PRV

Title: Authentication of Injection Molded Epoxy-Electronics Packages Using
Molecularly Imprinted Taggants

Inventors: Harry K. Charles, Jr., et al.

The international market place has been flooded with a variety of counterfeit merchandise. In some cases, such as clothing, the use of the counterfeit in place of the genuine article may have little consequence. In other cases, the use of a counterfeit can compromise the function of a critical piece of equipment and result in failure or possible loss of life. This places a responsibility on manufacturers to provide a means of authentication for their products for ethical reasons as well as to avoid false claims of liability.

The main concern in authentication is how to defeat the method. Usually, there is a trade off between ease of operation and ease of subversion. This entails the use of rather complicated methods to insure reliability. The following description details a method of authentication that is simple to use, has a tunable degree of information content and is virtually impossible to subvert. The basis of the method is a new technology called, "molecular imprinting," and the method is particularly well adapted to injection molded epoxy-based electronics packages.

Molecularly imprinted polymers are made by first building a complex of a target molecule and associated attached binding molecules that possess the ability to be incorporated into a polymer (see Figure 1). The complex is usually dissolved in a larger amount of other polymerizable molecules. The bulk of the other molecules for the polymer are made with crosslinking monomers. These molecules have two places to bind to the polymer chain to form a rigid three dimensional structure. The crosslinkers are necessary to hold the complexing molecules in place after the target molecule or "template" is removed. Typically, after polymerization, a chunk of plastic is obtained. This chunk is ground up into a powder and the target molecule is removed by washing it out with the right solvent. The powder is left with special holes that have a memory for the target molecule and are ready to recapture that specific molecule the next time it comes along. The process also works to create a binding site for a specific portion of a larger molecule that has, as part of its structure, the original target.

The application to authentication for injection molded epoxy packages is straight forward. Epoxies form highly crosslinked polymers. This is exactly the way molecular imprints are formed. By adding an innocuous "taggant" molecule to the epoxy, it will be incorporated into the resin. By choosing the correct taggant, it will be subsequently removable. The "taggant" molecules on the surface of the finished package can be removed by rinsing with an appropriate solvent. This process leaves cavities with dimensions on the molecular scale on the surface of the package. These cavities are invisible to normal methods of surface imaging and would be incomprehensible to atomic force microscopy due to the random orientation of the sites. Thus it will be impossible to reverse engineer the taggant method.

Authentication is provided in the following manner. The package is sprayed with a solution containing the "taggant" molecule that has been functionalized with a chromophore on a long alkyl chain or tether. The package is then rinsed and any package not imprinted will not bind the taggant. The chromophore will be chosen to luminesce when excited by light from a specific light source, say a lamp or small light emitting diode of the right wavelength. By using a mixture of taggants, information, such as date of manufacture, plant of origin, or other information can be encoded by color. By only removing the taggants from specific spots on the package a luminescent message can be encoded.

U.S. Patent application, serial no. 10/359,322, filed February 6, 2003, is hereby incorporated by reference herein in its entirety.

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Title: Authentication of Injection Molded Epoxy-Electronics Packages Using Molecularly Imprinted Taggants
Inventors: Harry K. Charles, Jr., et al.

4. DESCRIPTION OF THE TECHNOLOGY (Continued):

Specify the novel features of this invention. How does the invention differ from present technology?

There doesn't seem to be a material of this nature currently available. This has a very specific application to the electronics packaging industry.

What is the deficiency in the present technology upon which your invention improves?

Allows unambiguous authentication of critical electronic devices.

● Identify and describe the closest technological development of which you are aware.

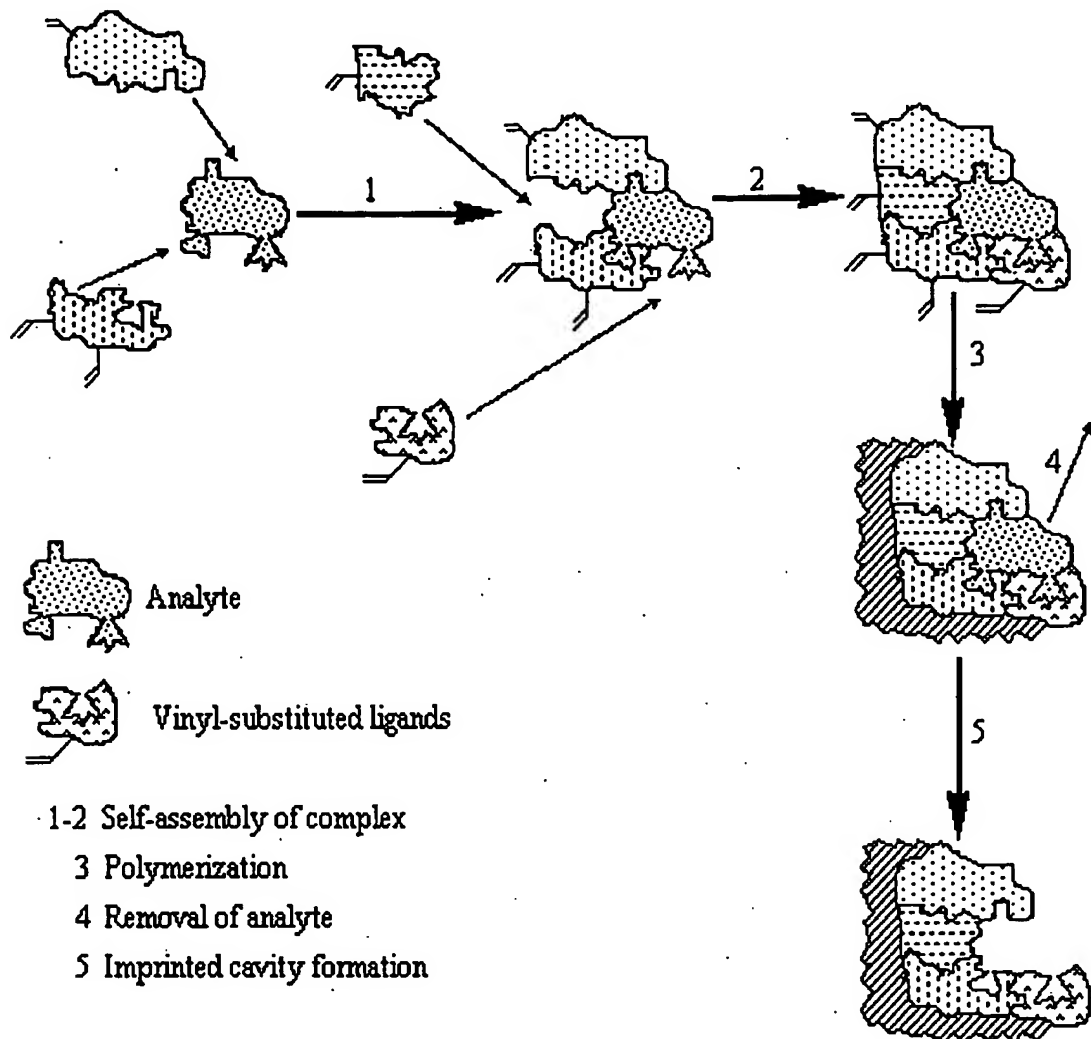
Serial numbers.

Title: Authentication of Injection Molded Epoxy-Electronics Packages Using Molecularly Imprinted Taggants

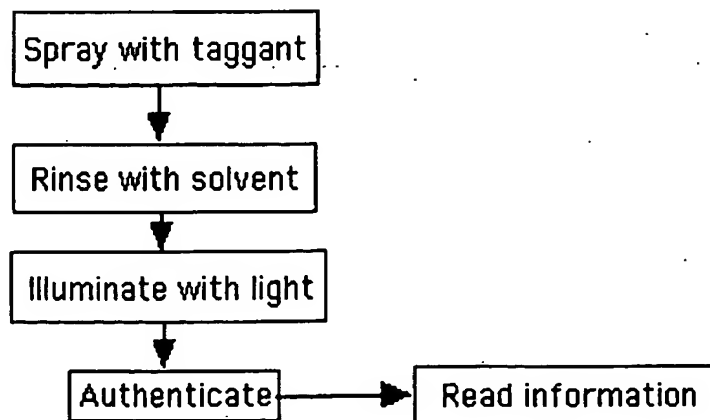
Inventors: Harry K. Charles, Jr., et al.

1. DESCRIPTION OF THE TECHNOLOGY:

Sketch or drawing of the invention. (Import or draw sketch here, or if space is insufficient staple your sketch to the printed copy of this form.)



- 1-2 Self-assembly of complex
- 3 Polymerization
- 4 Removal of analyte
- 5 Imprinted cavity formation



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World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse